

The significance of early childhood adversity

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In November 2012, the Royal Society of Canada and the Canadian Academy of Health Sciences released an expert panel report on early child development (1). Despite its broad title, the report's principal focus was the role of early childhood adversity in shaping risks of addiction and mental health problems in adolescence and young adulthood. Key questions that were addressed included:

- Are there identifiable adverse childhood experiences, such as abuse, neglect, chronic poverty, family dysfunction, chronic illness, family addiction and/or mental illness, that lead to poor mental health and unhealthy behaviours, such as addiction, in the adolescent and young adult?
- Is there evidence that the effects of these experiences are due to changes in brain structure and function?
- What is the evidence for the effectiveness of the interventions used to mitigate the effects of adverse childhood experiences on the developing child?

As a coeditor of the report, I believe that its most significant achievement was outlining a new, emerging science of human development that integrates genetics, epigenetics, neuroscience, life course epidemiology and developmental psychology to suggest how early experience can become biologically embedded; thus, fundamentally altering our understanding of how environment and biology jointly influence health and well-being over the life course. Here, I describe nine findings that warrant attention from Canadian paediatricians, family physicians, nurses and other health professionals caring for young children. Collectively, they should transform our understanding of, and attitudes toward, the nature and significance of adverse experiences in early childhood, and influence policy and practice in relation to them.

1. Early childhood is a sensitive period in human development (2), during which the brain, especially the circuitry governing emotion, attention, self-control and stress, is shaped by the interplay of the child's genes and experiences. As children grow, the biological and environmental factors that determine their development become increasingly intertwined. Thus, early adversity and later developmental health are linked through the structural and functional development of specific brain and nervous system circuits, from executive function to responses to stress.
2. Extended longitudinal research provides evidence that children who, early in life, contend with chronic adversities, such as family poverty, inappropriate care and child maltreatment are more likely to experience a broad range of impairments later in life (3). These difficulties range from emotional, behavioural, interpersonal, school- and stress-related adjustment problems to more severe difficulties, such as mental health problems, delinquency and criminal offending.
3. Developmental trajectories appear early in life (3) and tend to be subsequently reinforced through a cascade of differential exposures to stressful and risky social contexts. There is no

single path from early adversity to poor social, emotional, cognitive and mental health outcomes. Moreover, the effects of early adversity are moderated by a wide range of factors, from genes to community-level social support. Beyond parenting, broader factors – at the level of the extended family (eg, grandparents, aunts), community and society – also play an important developmental role.

4. Adverse childhood experiences that influence children's development do not only include dramatic events that are departures from social norms; the day-to-day interactions in children's lives are much more important than we had previously understood (3). It is the chronic, daily exposure to maltreatment, poor parenting and other adversities, rather than an individual dramatic occurrence of abuse, which causes the most damage to developmental health across our society.
5. Although exposure to early adversity is a significant predictor of later problems, they are not inevitable for all children (2). Rather, children vary tremendously in their response to adverse childhood experiences. Early childhood is a sensitive period when children may be more susceptible to both negative and positive experiences. Some children appear to be more biologically susceptible to social context than others and, thus, more predisposed to react to both stressful and nurturing environments. Most importantly, there is reason to believe that these children may also experience the most gains from intervention.
6. Early in life, the environment talks to genes and the genes listen (2). Brain development processes are, in part, governed by complex gene-environment interactions that affect the expression of genes. By gene-environment interaction, we mean that (multiple) genes convey a general susceptibility that may result in a negative outcome depending on the child's experience of environmental stressors. Our genes do not determine our traits; rather, there is a dynamic interplay between nature (genes) and nurture (environment). Recent advances in epigenetics now provide us with mechanisms that may explain how this occurs. Brain development is molded, in part, through changes in gene expression, embedding early experience in human biology, which leads to individual differences in developmental trajectories.
7. Parenting begets parenting (4). Individuals exposed to adverse childhood experiences tend to be less equipped to take on a parenting role when they are adults and, in the context of adverse circumstances and the absence of some form of social support and/or intervention, they are more likely to adopt inappropriate parenting behaviours and perpetuate a cycle of negative and adverse parenting across generations. The biological systems and pathways linking adverse childhood experiences to biology and behaviour also extend to the regulation of parenting behaviours, which implies that there is a disruption of the usual behavioural and physiological processes involved in normal parenting, including stress

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regulation. However, despite the probabilistic associations between early adversity and later emotional and parenting problems, most parents who experienced extreme adversity, such as physical abuse, when they were children will not adopt the same pattern with their child.

8. There is now a limited but promising body of research suggesting that child maltreatment and its associated outcomes can be reduced if targeted, intensive and sustained services are deployed (5). Targeting works best when implemented before a pattern of maltreatment has been established, not afterwards. The success of intense, sustained prevention programs targeting high-risk families at birth and early childhood emphasizes that these times are high-priority windows for intervention. Yet, despite all we now know about the importance of the early years, we still tend to ignore the experiences that occur early in the life course and only react when things go dramatically wrong during the teenage years and young adulthood (6).
9. In contrast, there is a paucity of credible research evidence examining how broader interventions at the level of childcare, school and community might influence adverse childhood experiences in ways that, in turn, would influence long-term developmental outcomes (5). In some respects, the problem is methodological. When engaging in intervention at the group level, each group (ie, each childcare centre, school or community) is an 'n of one' regardless of the number of children involved. Thus, the ability to recruit study groups with a sufficient sample size to conduct a randomized controlled trial with sufficient statistical power is usually beyond the resources of both investigators and granting agencies. Second, and most importantly, is the fact that responses to group-based interventions are very often mediated by the unique social dynamics within each specific intervention group. Because of this, community interventions rarely produce a statistically powerful main effect. Instead, intervention tends to increase the variability in outcomes across intervention groups because some groups successfully engage with the intervention and use it effectively, while others do not. Using traditional analytical techniques such as an outcome will be deemed 'negative' or 'weak' because, on average, the intervention groups will show minimal improvement compared with controls. Yet, thanks to economic, sociological and political science research, we now have insight into these sources of variation. Based on the findings from wide-ranging studies of community variation (eg, why Aboriginal teen suicide and Aboriginal employment levels vary hugely from band to band; why seniors die during heat waves in some neighbourhoods and not others; why some watershed communities maintain sustainable agriculture over a millennium while others do not; why the United States biogenetic technology industry is now concentrated in only three places, compared with thirty areas a few decades ago) there is now a strong evidentiary base revealing common underlying characteristics of groups, at the nongovernmental level, that successfully address these challenges. There are ways to evaluate group level interventions using this knowledge base, such as multistage implementation approaches. In broad terms: step one involves an introduction of the intervention to all selected communities; step two evaluates the variability in implementation integrity across groups; step three attempts to teach low implementation integrity communities the techniques that made high integrity

communities successful; step four evaluates the effects of step three and identifies communities where implementation integrity remains low; step five proposes alternate approaches for these communities; and step six evaluates outcomes, using dose-response analyses, where 'dose' is based on implementation integrity.

A CALL TO ACTION

The report concludes that Canada needs an era of experimentation that focuses on improving developmental trajectories in early childhood, working with groups as well as individual families and building evaluation data systems capable of detecting positive social change (6). Most importantly, the report concludes that whereas research is needed to bolster our current knowledge, there is more than enough evidence to justify the early years as possibly the most effective window of opportunity for investment to improve outcomes in the later years of childhood and youth. Our children deserve no less.

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The editors of *Paediatrics & Child Health* express their sympathies to the family and colleagues of Dr Clyde Hertzman, who passed away suddenly on February 8, 2013. As one of Canada's foremost researchers in population health and early childhood development, Dr Hertzman's work on the reach of the early years was groundbreaking. Canada has lost a passionate champion for children. His commitment to improving the conditions for young children was an inspiration to all of us.

Noni MacDonald, Editor-in-Chief